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LAMB, CHRISTOPHER RAY				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/664,681

**Applicant(s)**

PSALTIS ET AL.

**Examiner**

Christopher R. Lamb

**Art Unit**

2627

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 April 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1, 3-8 and 10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 3-8 and 10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-946)
- 3) ☐ Information Disclosure Statement(s) (PTO/CDC)
- Paper No(s) Mail Date \_\_\_\_\_

- 4) ☐ Interview Summary (PTO-413)  
Paper No(s) Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 23rd, 2008 has been entered.

### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1, 3-8 and 10 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Regarding claim 1:

The subject matter that is not enabled is "placing a plurality of different carriers of different colors at each of a plurality of locations on a rotating data storage medium disk to represent data by the presence and absence of said colors."

One of ordinary skill in the art would be unable to perform this method step without undue experimentation.

The specification discloses that the claimed "different carriers of different colors" are quantum dots, which are "nano-scale crystalline structures" (specification: page 10, line 14). These quantum dots are "approximately 10 nm" in size (specification: page 11, line 7).

The specification proposes three methods of placing these different carriers of different colors: first, using inkjet based technology; second, using holey fibers; and third, using laser induced technology. These three methods correspond to dependent claims 7, 9, and 8, respectively. The specification is not enabling for any of these three proposed methods.

To decide whether the disclosure does not satisfy the enablement requirement, and whether any necessary experimentation is undue, the Examiner has weighed in particular the following factors:

(A) The nature of the invention.

The basic concept has already been discussed, but of particular note is that the specification discloses that "the present invention can increase the storage capability [of a disk drive] by several orders of magnitude. The present invention provides this advantage by multiplying the amount of data that can be stored at each pit" (specification: page 8, lines 7-9). The disclosure later suggests "a storage density of say 1 terabit/square inch," (specification: page 12, lines 7-8), which is enormously larger than current storage capacities.

(B) The state of the prior art.

The Examiner has found no evidence that placing quantum dots at this level of storage density is so well understood or well known that one of ordinary skill would be able to make the invention without more detailed direction from the inventor. The Applicant cites in the specification several papers, apparently to demonstrate the level of knowledge in the art, but these papers do not teach or suggest any part of the claimed element in question. They are not directed to optical recording at all.

(C) The amount of direction provided by the inventor.

The inventor provides no direction whatsoever. To discuss each of the three methods in turn:

(i) Inkjet based technology.

The Applicant's disclosure of the inkjet based technology consists entirely of a theoretical calculation of the achievable storage density (specification: pages 12-13). The disclosure implies that a standard inkjet nozzle would be sufficient to place these quantum dots (each with an approximate size of 10nm) with such specificity as to achieve a storage density near to or exceeding  $1 \text{ Tb/in}^2$ , requiring printing on the scale of a commercial disk spot size of  $0.32 \text{ }\mu\text{m}$ . Considering that this resolution is several orders of magnitude higher than typical inkjet printing, it would appear that more direction would be required to enable this method.

(ii) Holey fibers

The Applicant describes holey fibers (specification: page 13), but does not discuss at all how they could be used to place quantum dots on the medium. Applicant does not have a single drawing depicting holey fibers or their use.

(iii) Laser induced technology

The Applicant references an article by Wenzel et al. that discloses the shaping of nanoparticles. Applicant essentially summarizes the article in the disclosure (specification: page 14), and then goes on to suggest, in one paragraph, how it could be applied to optical recording (specification: pages 14-15). However, the article does not itself discuss optical recording, and Applicant provides no details as to how to adapt or use the technology in this context.

(D) The existence of working examples.

There are none.

Regarding claims 2-8 and 10:

They are dependent on claim 1. Additionally, claims 7 and 8 are specifically directed to the placing of said carriers.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 3, 4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bawendi et al. (US 6,774,361) in view of Brownstein et al. (US 5,671,202).

Regarding claim 1:

Bawendi discloses:

A method of storing data comprising:

placing a plurality of carriers of different colors at each of a plurality of locations (column 5, lines 45-65: since there may be multiple dots, there is a plurality of locations) on a disk (a disk is among the possibilities disclosed in column 14, lines 15-50) and representing data by the presence and absence of said colors (column 12, lines 24-65; that the quantum dots are different colors is disclosed in, for example, column 10, lines 25-40);

exciting said colors within said carriers by making them fluoresce (column 10, line 40 to column 11, line 10: "an excitation source");

measuring said fluorescence of said carriers to identify presence and absence of said colors (column 10, line 40 to column 11, line 10: "the luminescence from the dots" is the fluorescence).

Bawendi does not disclose wherein the disk is a "rotating data storage medium disk." However, Bawendi discloses using the quantum dots to create a bar code (column 5, lines 45-65).

Brownstein discloses recording a bar code on a rotating data storage medium disk (abstract, Fig. 5).

It would have been obvious to one of ordinary skill in the art to include in Bawendi recording the bar code on a rotating data storage medium disk, as taught by Brownstein.

The rationale is as follows:

Brownstein discloses that a bar code on a rotating data storage medium disk provides increased security (abstract; column 1, lines 10-25).

Bawendi discloses that quantum dots can be used to provide a versatile and dense encoding scheme (column 9, lines 55-65).

It is obvious to combine the two because the combination is simply substituting one known element for another (the quantum dot barcode of Bawendi for the regular barcode of Brownstein); the quantum dot barcode is an improvement over the regular barcode; and one of ordinary skill could have combined the two with predictable results.

Regarding claim 3:

In Bawendi in view of Brownstein, the carriers and nanometer size fluorescent particles (abstract: Bawendi uses the same quantum dots as Applicant).

Regarding claim 4:

In Bawendi in view of Brownstein, the particles comprise quantum dots (Bawendi: abstract).

Regarding claim 6:

In Bawendi in view of Brownstein, said quantum dots are made up of a plurality of shades of a color (there are two ways Bawendi meets this claim. First, in column 6, lines 45-50: Bawendi discloses that there may be as many as 20 "discrete emissions." Since each discrete emission is a different color, if there are 20 of them there must be a plurality of shades of at least one standard color, since there are only eight of those: i.e., red, yellow, orange, green, blue, indigo, or violet. Alternatively, Bawendi discloses in column 7, lines 15-30, that a given

wavelength may have 2-15 different intensities: thus that wavelength will be darker or lighter, or, "shaded").

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bawendi in view of Brownstein as applied to claim 4 above, and further in view of Applicant's admitted prior art.

Regarding this claim:

Bawendi in view of Brownstein discloses a method of storing data as discussed above.

Bawendi in view of Brownstein does not disclose "wherein said quantum dots are made up of a red, blue, and green color."

However, Bawendi does disclose that the quantum dots should be made up of three colors (column 9, lines 25-60: the "three different particle size distributions" correspond to three different colors).

In the previous Office Action, the Examiner took Official Notice that red, blue, and green is the standard color space used in computing, displays, and printing. Since Applicant did not traverse the taking of Official Notice, this fact is now taken as admitted prior art. See MPEP 2144.03.

It would have been obvious to include in Bawendi in view of Brownstein wherein the three colors are red, blue, and green.

The motivation would have been to pick the colors that make up the normal standard, for ease in computer processing, displaying, and printing the results.

6. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bawendi in view of Brownstein as applied to claim 1 above, and further in view of Metz (US 5,166,813).

Regarding claim 10:

Bawendi in view of Brownstein discloses a method for storing data as discussed above in the rejection of claim 1.

Bawendi in view of Brownstein does not disclose "wherein a HSMF is used for dispersing collimated fluorescent light on a spectrally sensitive component." However, note that Bawendi does disperse collimated fluorescent light on a spectrally sensitive component (column 11, lines 10-20: it "spectrally resolve[s] the colors" to a detector).

Note that Applicant defines a HSMF as a "holographic multi-spectral filter" in the specification (page 17).

Metz discloses that when detecting fluorescence, a holographic multi-spectral filter is used for dispersing collimated fluorescent light on a spectrally sensitive component (the abstract discloses the use of a holographic filter; Fig. 1 depicts the light impacting the spectrally sensitive component; column 12, lines 40-50 discloses that the hologram can be multi-spectral: that is, it transmits more than one wavelength). Metz discloses that a holographic filter is more efficient (column 13, lines 1-15).

It would have been obvious to one of ordinary skill at the time of the invention to include in Bawendi in view of Brownstein a holographic multi-spectral filter as taught by Metz. The motivation would have been to be more efficient.

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7. Claims 1, 3, and 4-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over McGrew (US 6,692,031) in view of Brownstein.

Regarding claim 1:

McGrew discloses:

A method of storing data comprising:

placing a plurality of carriers of different colors at each of a plurality of locations on a medium and representing data by the presence and absence of said colors (column 5, lines 5-25: "20 or more distinct sizes" corresponds to 20 more more colors);

exciting said colors within said carriers by making them fluoresce (a reader reads the fluorescence signature: column 4, lines 20-35);

measuring said fluorescence of said carriers to identify presence and absence of said colors (again, column 4, lines 20-35).

McGrew does not disclose:

wherein said medium is a "rotating data storage medium disk." However, McGrew does disclose that the carriers are used to provide a distinct signature or marking (column 2, lines 20-40).

Brownstein discloses:

recording an identification marking on a rotating disk storage medium disk (column 2, lines 10-25).

It would have been obvious to one of ordinary skill in the art to include in McGrew placing the plurality of carriers on a rotating data storage medium disk.

The rationale is as follows:

Brownstein discloses the need to recording identification marking on a rotating data storage medium disk.

McGrew discloses that quantum dots are a superior means of recording identification marks (column 2, lines 20-40).

It would have been obvious to combine them because the combination is the simple substitution of one known element for another (the quantum dots of McGrew for the barcode of Brownstein); the substituted element (the quantum dots) is a superior means; and one of ordinary skill could have combined the two with predictable results.

Regarding claim 3:

In McGrew in view of Brownstein, said carriers are nanometer size fluorescent particles (quantum dots; McGrew: column 5, lines 5-25).

Regarding claim 4:

In McGrew in view of Brownstein, said particles comprise quantum dots (McGrew: column 5, lines 5-25).

Regarding claim 5:

McGrew in view of Brownstein discloses a method of storing data as discussed above.

McGrew in view of Brownstein does not disclose "wherein said quantum dots are made up of a red, blue, and green color."

However, McGrew does disclose wherein there are 20 or more distinct sizes of particles (column 5, lines 5-35). Since each size is a different color, there are thus 20 or more distinct colors of quantum dots.

Therefore it would be obvious to one of ordinary skill in the art at the time of the invention to include wherein some of the quantum dots are red, blue, and green, because with 20 or more colors, it would be obvious to have red, blue, and green among them, as these are standard colors. Furthermore, the Applicant does not disclose that the use of red, blue, or green solves any stated problem or is for any particular purpose (they are selected only "for purposes of example" on page 8 of the specification), and it appears the invention would perform equally well with any colors.

Regarding claim 6:

In McGrew in view of Brownstein, said quantum dots are made up of a plurality of shades of a color (In column 5, lines 5-35, McGrew discloses there may be 20 or more distinct sizes. Since each distinct size corresponds to a different color, if there are 20 of them there must be a plurality of shades of at least one standard color, since there are only eight of those: i.e., red, yellow, orange, green, blue, indigo, or violet.)

Regarding claim 7:

McGrew in view of Brownstein, discloses wherein said placing of said carriers is performed using inkjet based technology (column 6, lines 10-20).

Regarding claim 8:

McGrew in view of Brownstein, discloses wherein said placing of said carriers is performed using laser-induced technology (column 5, lines 5-35: a laser is used to fix the dots).

8. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over McGrew in view of Brownstein as applied to claim 1 above, and further in view of Metz (US 5,166,813).

Regarding claim 10:

McGrew in view of Brownstein discloses a method for storing data as discussed above in the rejection of claim 1.

McGrew in view of Brownstein does not disclose "wherein a HSMF is used for dispersing collimated fluorescent light on a spectrally sensitive component."

Note that Applicant defines a HSMF as a "holographic multi-spectral filter" in the specification (page 17).

Metz discloses that when detecting fluorescence, a holographic multi-spectral filter is used for dispersing collimated fluorescent light on a spectrally sensitive component (the abstract discloses the use of a holographic filter; Fig. 1 depicts the light impacting the spectrally sensitive component; column 12, lines 40-50 discloses that the hologram can be multi-spectral: that is, it transmits more than one wavelength). Metz discloses that a holographic filter is more efficient (column 13, lines 1-15).

It would have been obvious to one of ordinary skill at the time of the invention to include in McGrew in view of Brownstein a holographic multi-spectral filter as taught by Metz. The motivation would have been to be more efficient.

### ***Response to Arguments***

9. Applicant's arguments filed April 23rd, 2008 have been fully considered but they are not persuasive.

Applicant first argues with the rejection of all the claims under 35 U.S.C. 112, first paragraph, as not enabled.

Regarding the use of inkjet technology, Applicant quotes a section of the specification (the two quoted paragraphs are the specification's entire disclosure on this subject), and argues that it is enabling, because it suggests a number of printheads and a suggested number of drops/second.

However, the Examiner found the disclosure not enabling because it does not address two critical issues: that the quantum dots used by applicant are much smaller than regular inkjet ink, and because the disclosed print resolution is much, much, much higher than regular inkjet resolution. For one of ordinary skill to address these two problems, undue experimentation would be required.

On the same subject, Applicant argues that the disclosure is not limited to the pit sizes disclosed in the specification, and implies that the quantum dots could be placed in much larger pits which would not require as much print accuracy.

However, the specification is clearly directed toward placing quantum dots in pits used in CDs, DVDs, etc: see, for example, page 7, "the embodiments of the present invention are a method and an apparatus for increasing data storage capacities of CD-ROM disks, write once read many (WORM) disks, or commercially available CD-RWs and DVDs." These pits are much smaller than standard print accuracies. Although the specification does say it could be used in pits of "any dimensions" (page 8), in the context of the preceding paragraph, this statement just indicates that the pits don't have to be smaller than the laser spot

size in order to increase storage capacities: i.e., a typical method of improving storage capacity would be to make pits even smaller than a DVDs, and it is unnecessary here. There's no indication in the disclosure of placing the quantum dots in pits of a size usable with regular inkjet printer accuracy.

Next, Applicant argues that the specification "describes in detail" the laser induced technology. In this case, Applicant contends that an article quoted in the specification provides sufficient detail. However, this article is not directed to optical recording: it is about an experiment on individual particles, not placed near one another or on a "rotating disk storage medium" as per the claim language. In order to adapt this unrelated technique to optical storage, undue experimentation would be required.

Regarding the arguments directed at the claim rejections under 35 USC 102 and 103, they are moot due to the new grounds of rejection.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher R. Lamb whose telephone number is (571) 272-5264. The examiner can normally be reached on 9:00 AM to 5:30 PM Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Feild can be reached on (571) 272-4090. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Joseph H. Feild/  
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CRL 5/15/08